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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/200,495	11/25/1998	PETER C. VAN BUSKIRK	2771-337(PC8	4898

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ATMI, INC.
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EXAMINER

HU, SHOUXIANG

ART UNIT PAPER NUMBER

2811

DATE MAILED: 07/14/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/200,495

Applicant(s)

VAN BUSKIRK ET AL.

Examiner

Shouxiang Hu

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 23 April 2004.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 40-45, 47, 49, 51-54, 61 and 63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 40-45, 47, 49, 51-54, 61 and 63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Objections

1. Claims 40-45, 47, 49, 51-54, 61 and 63 are objected to because of the following informalities and/or defects:

Claims 40 and 61 each recite the subject matter that the recited top electrode can be formed of an oxygen barrier layer formed of Rh or Rh oxide. However, the original disclosure lacks an adequate description regarding whether and in what sense Rh and Rh oxide can be an oxide barrier layer.

Claim 52 recites that oxygen is not incorporated in the electrode material, but the disclosure fails to definitely define whether oxygen is absolutely not incorporated into the electrode material. According to the specification, the recited top electrode is formed in the presence of oxygen, which naturally results in certain oxygen elements existing in the metal top electrode. And, the disclosure does not adequately describe how to form an absolutely pure metal top electrode in the presence of oxygen. Thus, in view of the specification, the term of "not incorporated" as recited in claim 52 is interpreted as meaning: not substantially incorporated.

Claim 63 recites the subject matter that the recited top electrode can be formed of Rh or Rh oxide. However, an adequate description regarding this subject matter cannot be found in the original specification.

In addition, in claim 63, the term of "maintained through" should read as: -- maintained during--.

Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

Claims 40-43, 47, 49, 51, 53 and 63, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura (US 6,229,168).

Nakamura discloses a microelectronic device structure (Figs. 28 D and/or 25; also see col. 7, lines 16-21 and 50-67; and col. 9, lines 24-43), comprising: a bottom electrode layer (13), a ferroelectric oxide film (8; lead zirconium titanate, PZT); and a top electrode (15, Ir oxide), wherein the ferroelectric film is naturally substantially stoichiometrically complete in oxygen concentration as oxygen vacancy therein can be prevented.

Regarding claim 49, the term regarding "oxygen diffusion barrier" therein is interpreted as an indented use limitation, and the Ir top electrode layer 37 in Fig. 25 of Nakamura can block the diffusion of at least some of the oxygen atoms or ions.

Regarding claim 51, it is noted that IrO₂ is a common form of Ir oxide.

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Regarding claims 53 and 63, it is noted that the Ir oxide electrode layers (13 and 15) in Nakamura are naturally formed through sputtering of Ir metal in the presence of oxygen, and naturally without the need for post-deposition annealing in oxygen.

Claims 52 and 54, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 102(e) as being anticipated by Nakamura, or, in the alternative, are rejected under 35 U.S.C. 103(a) as being obvious over Nakamura.

The disclosure of Nakamura is discussed as applied to claims 40-43, 47, 49, 51, 53 and 63 above.

And, it is noted that Nakamura discloses the claimed invention, as the layer 37 in Fig. 25 of Nakamura is formed of Ir; and such a metal layer is naturally readable as a top electrode for the capacitor.

Furthermore, it is noted that these two claims are treated as product by process claims. And the limitations regarding "formed in" and/or "formed on" therein are process limitations and carry no patentable weight, since distinctive structures are not necessarily produced, given the fact that oxygen vacancy is naturally prevented in the ferroelectric film material (see col. 9, lines 39-47), and thus it is substantially stoichiometrically complete in oxygen concentration.

Or, in the alternative, the claimed invention is obvious over Nakamura, as the recited process of sputtering or evaporating in oxygen are art-known method for forming a non-substantially oxidated metal layer.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 44, 45 and 61, as being best understood in view of the claim objections above, are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakamura in view of Miki et al. ("Miki"; WO98/01904, Jan. 15, 1998; also see US 6,309,894 for its English translation) and/or Park et al. ("Park"; 5,892,254)

The disclosure of Nakamura is discussed as applied to claims 40-43, 47, 49, 51-54 and 63 above.

Nakamura does not expressly disclose that the ferroelectric film material can be formed of strontium titanates (BST) or strontium bismuth tantalate (SBT), and that the top electrode can be formed of Rh or Rh oxide. However, each of these materials is an art-recognized common ferroelectric material or electrode material, as evidenced in Miki (see col. 4, lines 34-54 for the recited ferroelectric materials), and as evidenced in Park (see col.1, lines 35-44, and col. 2, lines 17-19 for the recited electrode materials).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to make the microelectronic device of Nakamura with any of the recited art-known ferroelectric materials and/or with any of the recited art-known top electrode materials, per the teachings of Miki and/or Park, so that a microelectronic

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device with desired material choice and stable capacitor performance would be obtained.

Response to Arguments

3. Applicant's arguments with respect to claims 40-45, 47, 49, 51-54, 61 and 63 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Shouxiang Hu whose telephone number is 571-272-1654. The examiner can normally be reached on Monday through Thursday, 7:30 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>.

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Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

SH
July 08, 2004

A handwritten signature in black ink, appearing to read "Shouxiang Hu", written in a cursive style.

SHOUXIANG HU
PRIMARY EXAMINER